

Goal: Estimate A given K observations of Z with $Z=A+N$.

$$A \sim N(\mu_A, \sigma_A^2) \text{ and } N \sim N(0, \sigma_n^2)$$

$$a \text{ - posteriori pdf} = f_{A|Z_1, \dots, Z_K} \sim N(\mu_P, \sigma_P^2)$$

$$\sigma_P^2 = \frac{1}{\frac{K}{\sigma_n^2} + \frac{1}{\sigma_A^2}} \text{ and } \mu_P = \sigma_P^2 \left(\frac{K\bar{Z}}{\sigma_n^2} + \frac{\mu_A}{\sigma_A^2} \right)$$

$$\text{Where } \bar{Z} = \frac{1}{K} \sum_{i=1}^K Z_i$$

and z_1, \dots, z_K are the K observations

$$\hat{A}_{MS} = \hat{A}_{MAP} = \mu_P \text{ and } \hat{A}_{ML} = \bar{Z}$$